DMMP Proposed Revision to the Open-water Disposal Guidelines for Dioxins in Dredged Material

PUBLIC WORKSHOP May 28, 2009
DREDGING IMPACT, RELATIVE RISK

WASHINGTON STATE DEPARTMENT OF Natural Resources

US Army Corps of Engineers®

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

DEPARTMENT OF ECOLOGY
State of Washington

Existing Concentrations at and Near Non-Dispersive Disposal Sites –

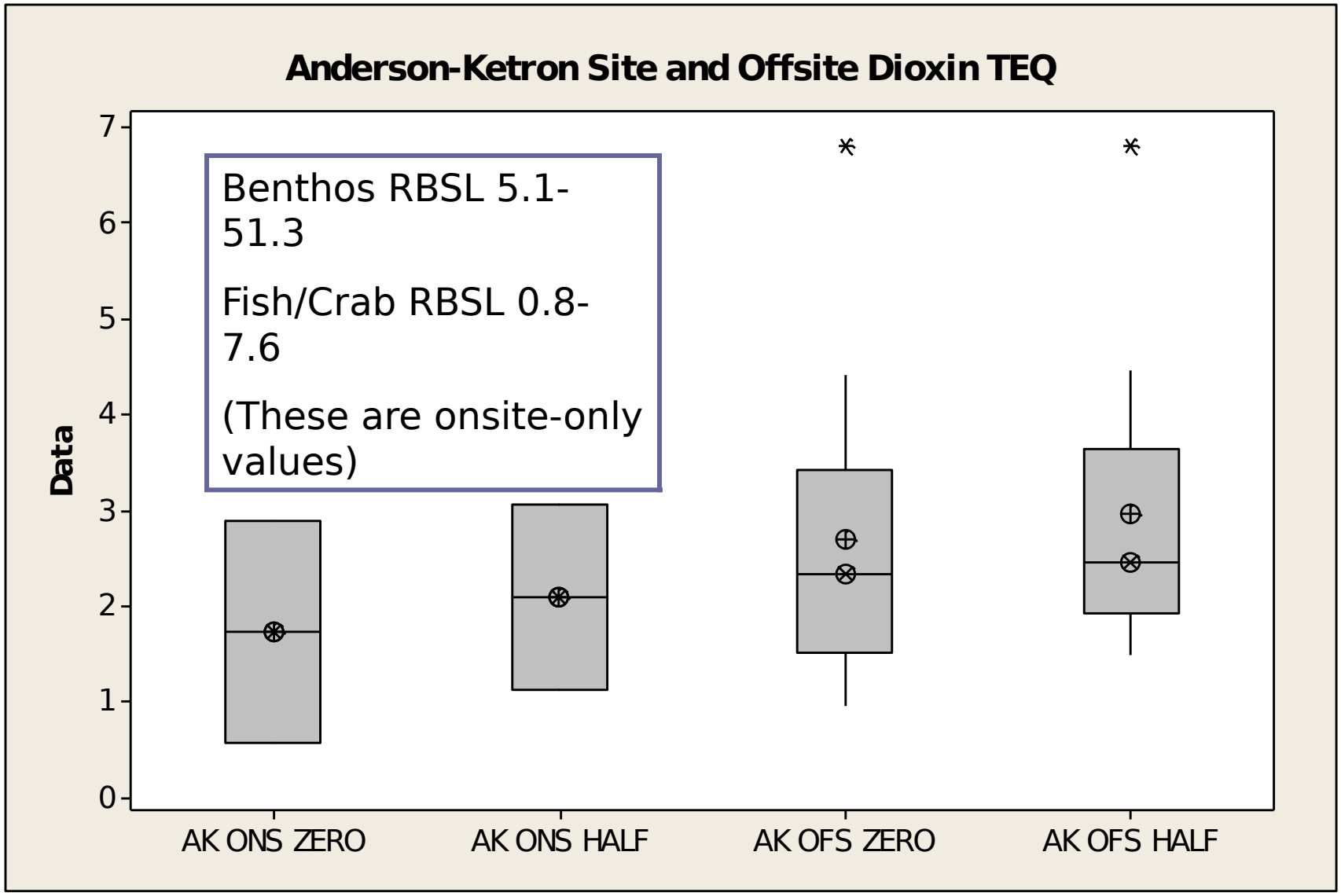
Comments have been received re: conclusions regarding concerns and solutions that can be drawn from evaluation of existing conditions - discuss

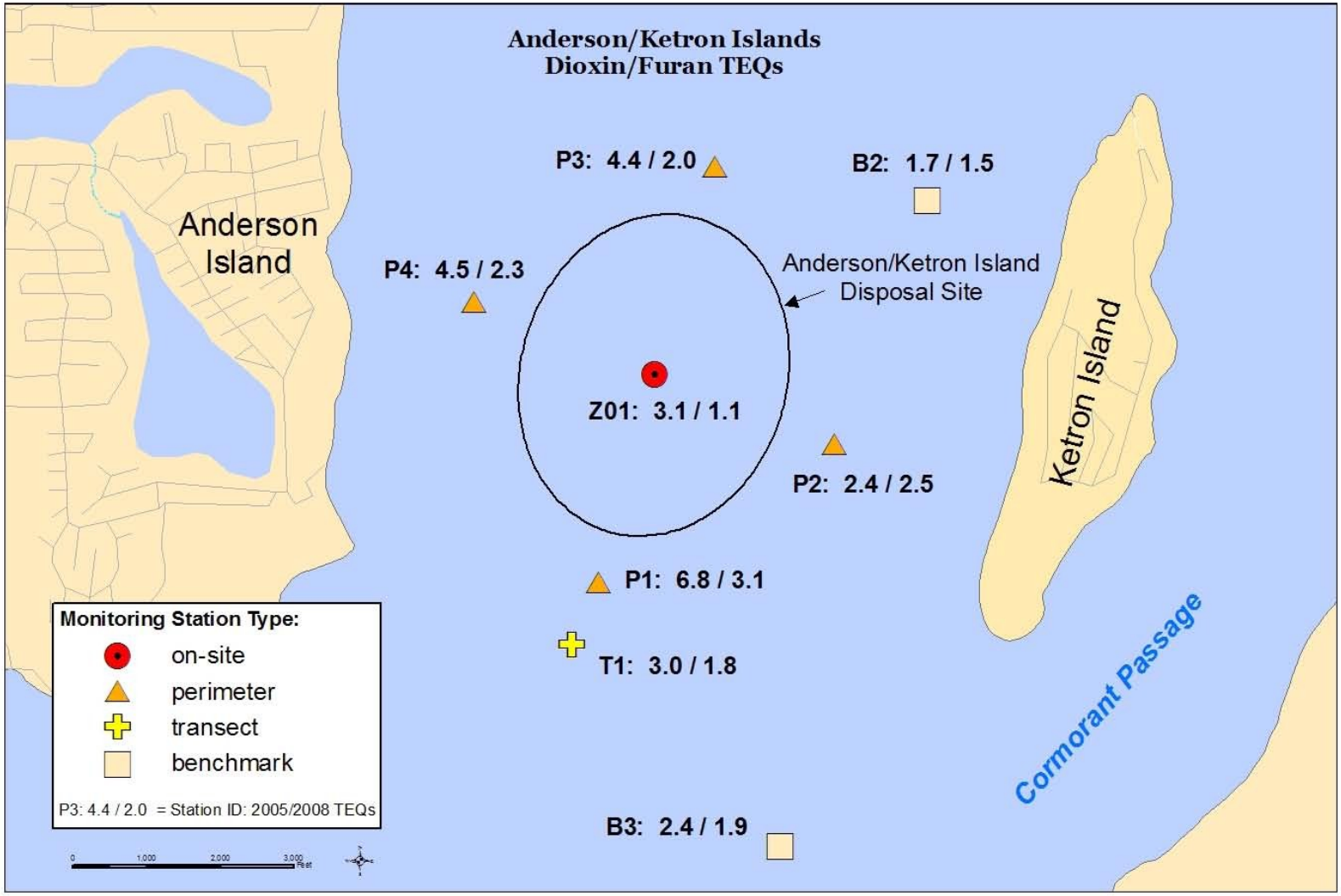
Non-Dispersive Disposal Site Sediment and Tissue Data Posted to the Website

Box-Plot Conventions

- AK = Anderson Ketron; EB = Elliott Bay; PG = Port Gardner; BB = Bellingham Bay; CB = Commencement Bay,
- ONS = onsite; OFS = offsite (stations at a minimum 1/8th mile away)
- Half, Zero = method of non-detect substitution
- The boxes show the middle two quartiles of the data, the whiskers the first and fourth quartiles.
- Outliers are shown by an asterisk
- Medians are shown by the line and ⊗
- Means are shown by a ⊕
- The Y axis is ng TEQ/kg

Anderson-Ketron (2005,

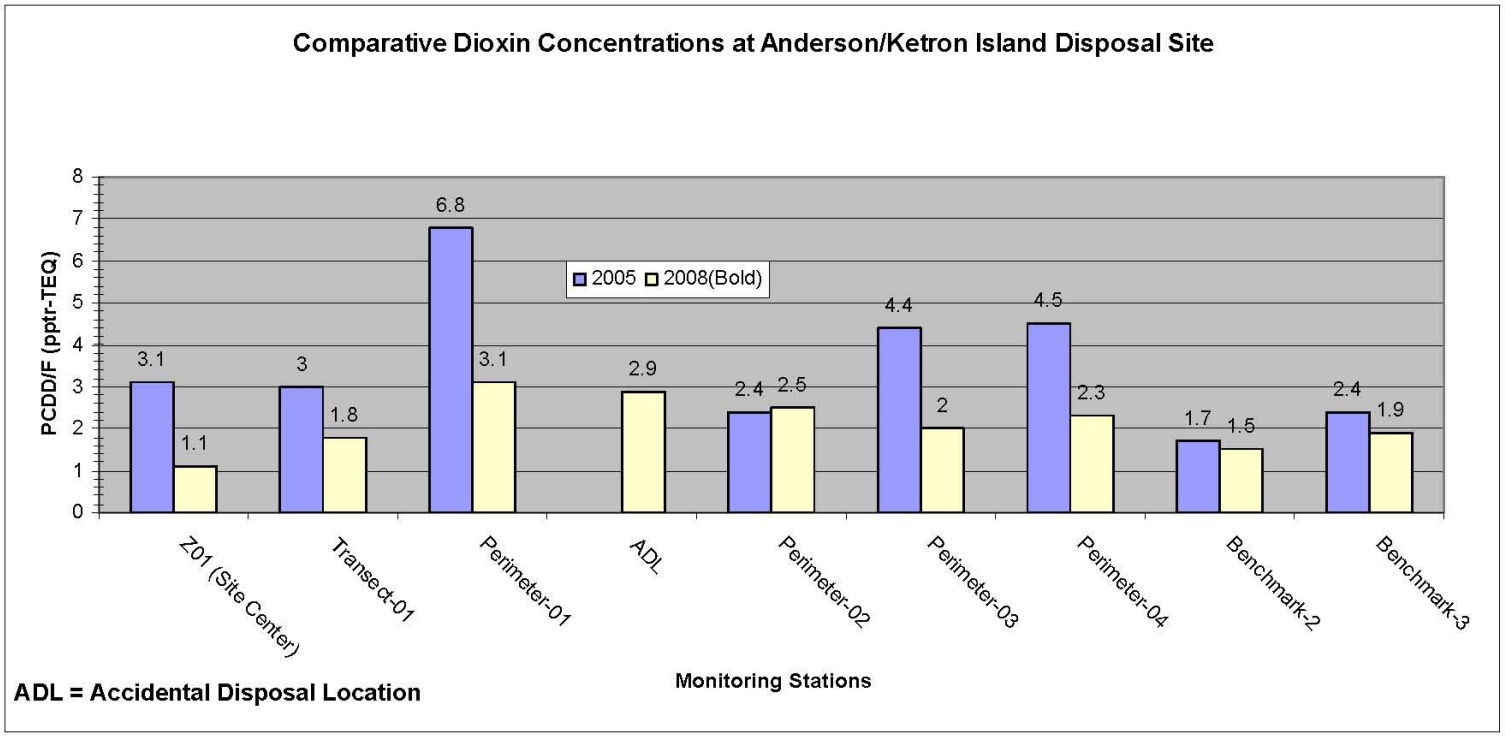



Anderson/Ketron Islands
Dioxin/Furan TEQs
P3: 4.4 / 2.0
B2: 1.7 / 1.5
Anderson
Island
P4: 4.5 / 2.3
Anderson/Ketron Island
Disposal Site
Ketron Island
Z01: 3.1 / 1.1
P2: 2.4 / 2.5
P1: 6.8 / 3.1
T1: 3.0 / 1.8
Cormorant Passage
B3: 2.4 / 1.9
Monitoring Station Type:
on-site
perimeter
transect
benchmark
P3: 4.4 / 2.0 = Station ID: 2005/2008 TEQs
0
1,000
2,000
3,000
Feet

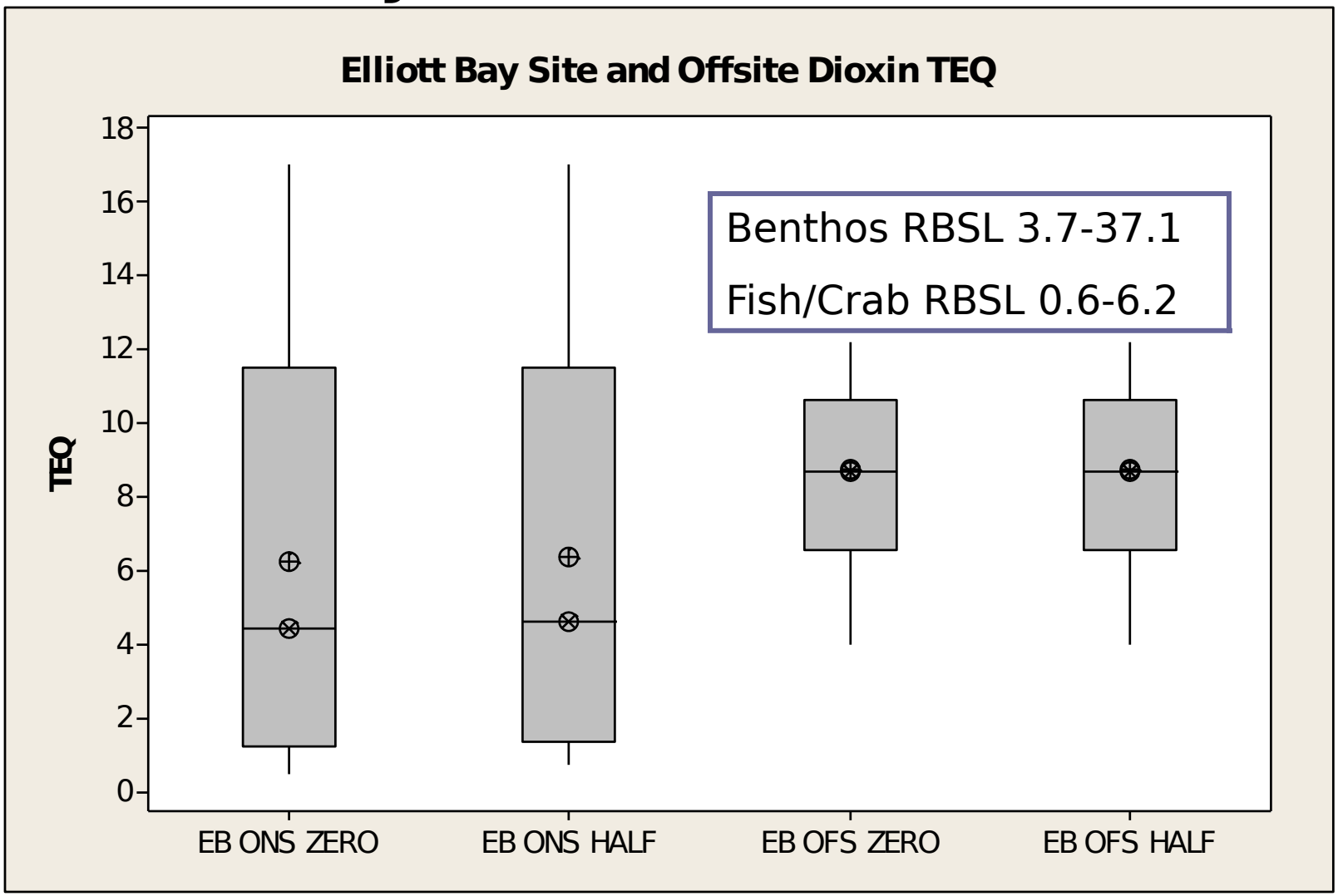
Volume Weighted Mean Dioxin Concentrations for the Federal Material Dredged in DY08 from the Olympia Harbor Project

DMMU Core ID	Depth, ft	Volume (CY)	TCDD/F TEQ	ng/kg-dw	Product (Vol x TEQ)	ng x cy/kg x DMMU	Product/total	Proportional contribution/Suitable DMMU
15	0-3	21,283	3.0	ng/kg-dw	64,417.26	ng x cy/kg	29.2%	% of Total DMMU
16a	0-4	21,584	0.11	ng/kg-dw	2,395.82	ng x cy/kg	1.1%	% of Total DMMU
16b	4-19	31,771	0.13	ng/kg-dw	4,101.64	ng x cy/kg	1.9%	% of Total DMMU
17	0-3	18,359	6.7	ng/kg-dw	122,968.58	ng x cy/kg	55.8%	% of Total DMMU
19	0-4	7,952	6.2	ng/kg-dw	49,302.40	ng x cy/kg	22.4%	% of Total DMMU
Totals (Suitable):		100,949 cy			243,185.70	ng x cy/kg	2.41	ng/kg-dw/Project (Volume Weighted Average)

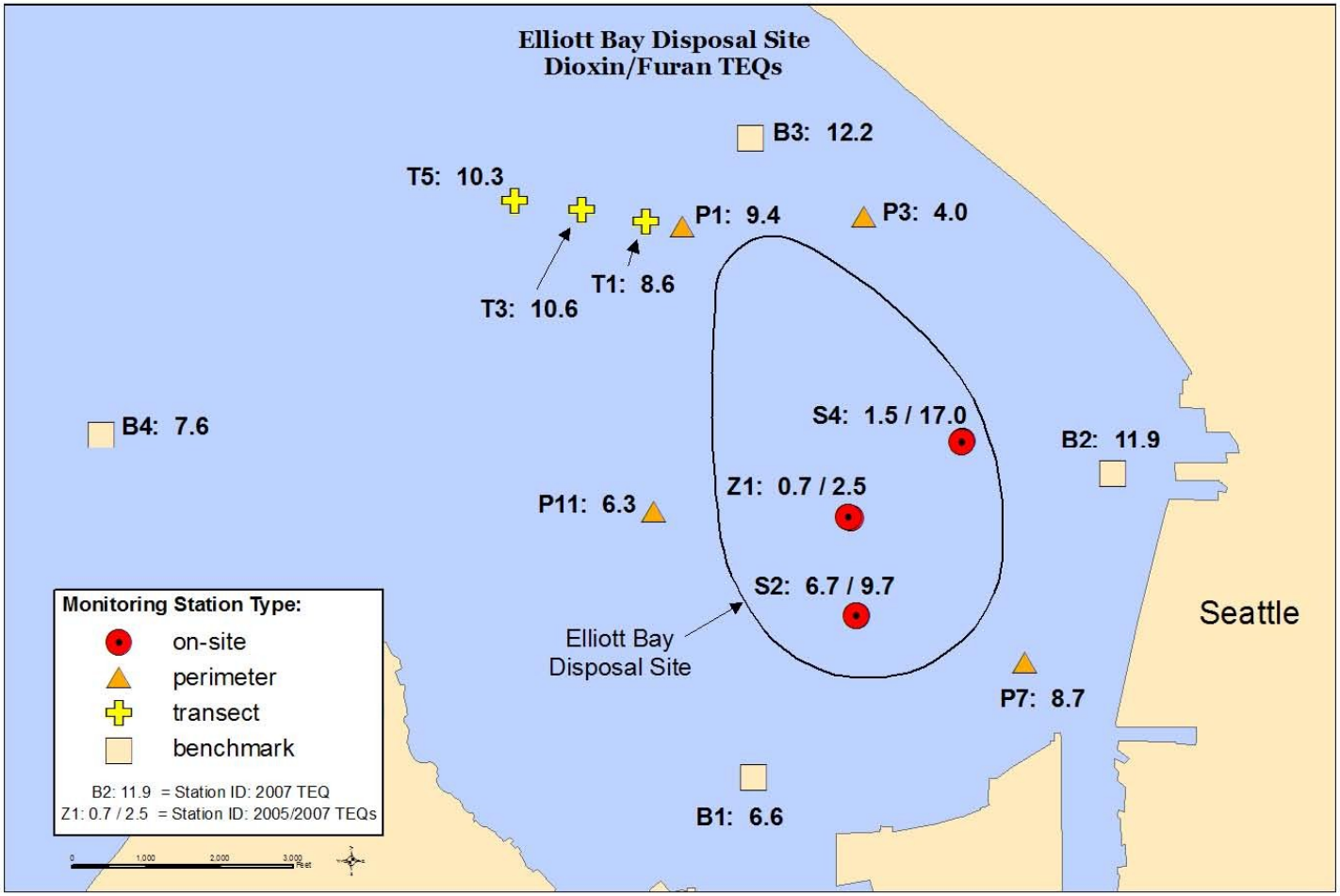
Note: Actual Olympia Harbor Federal O&M disposal at the A/K Site = 94,810 cy



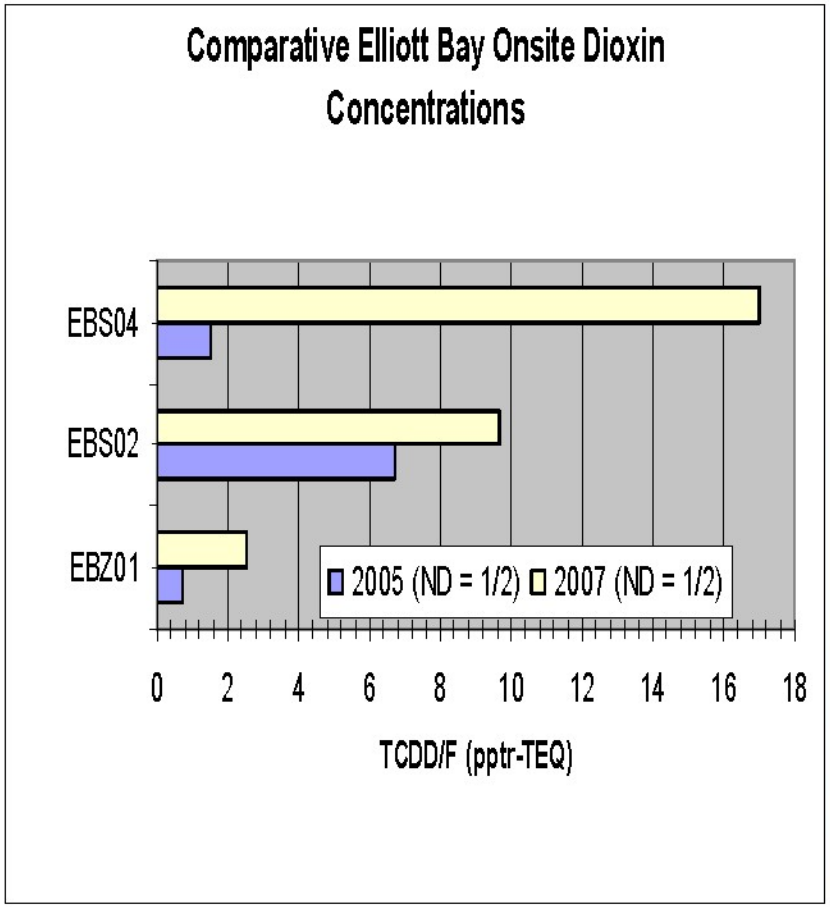
Elliott Bay (2005, 2007)*

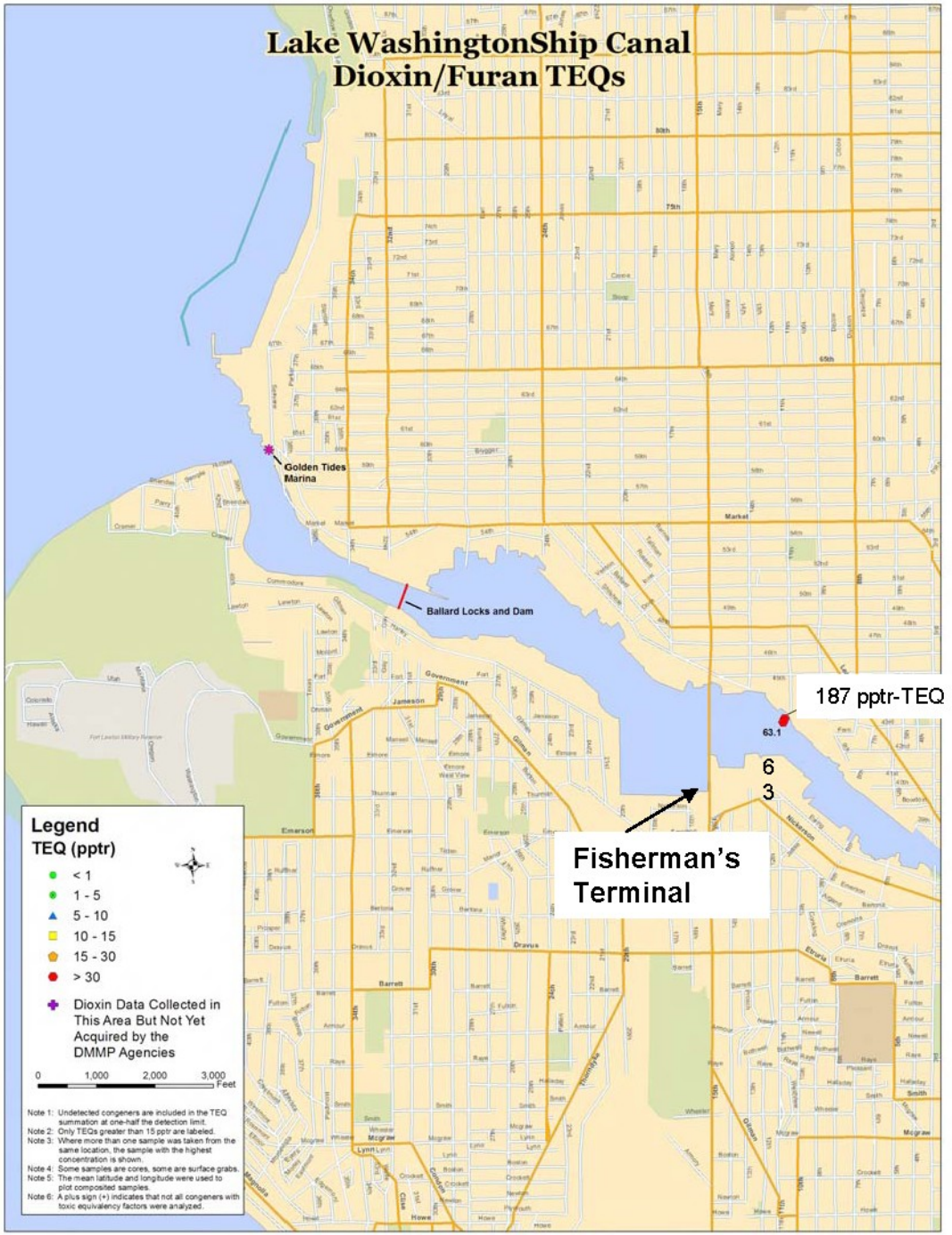


*The 2005 ONS values ranged from 2.2-6.4 ng TEQ/kg (0.5DL)

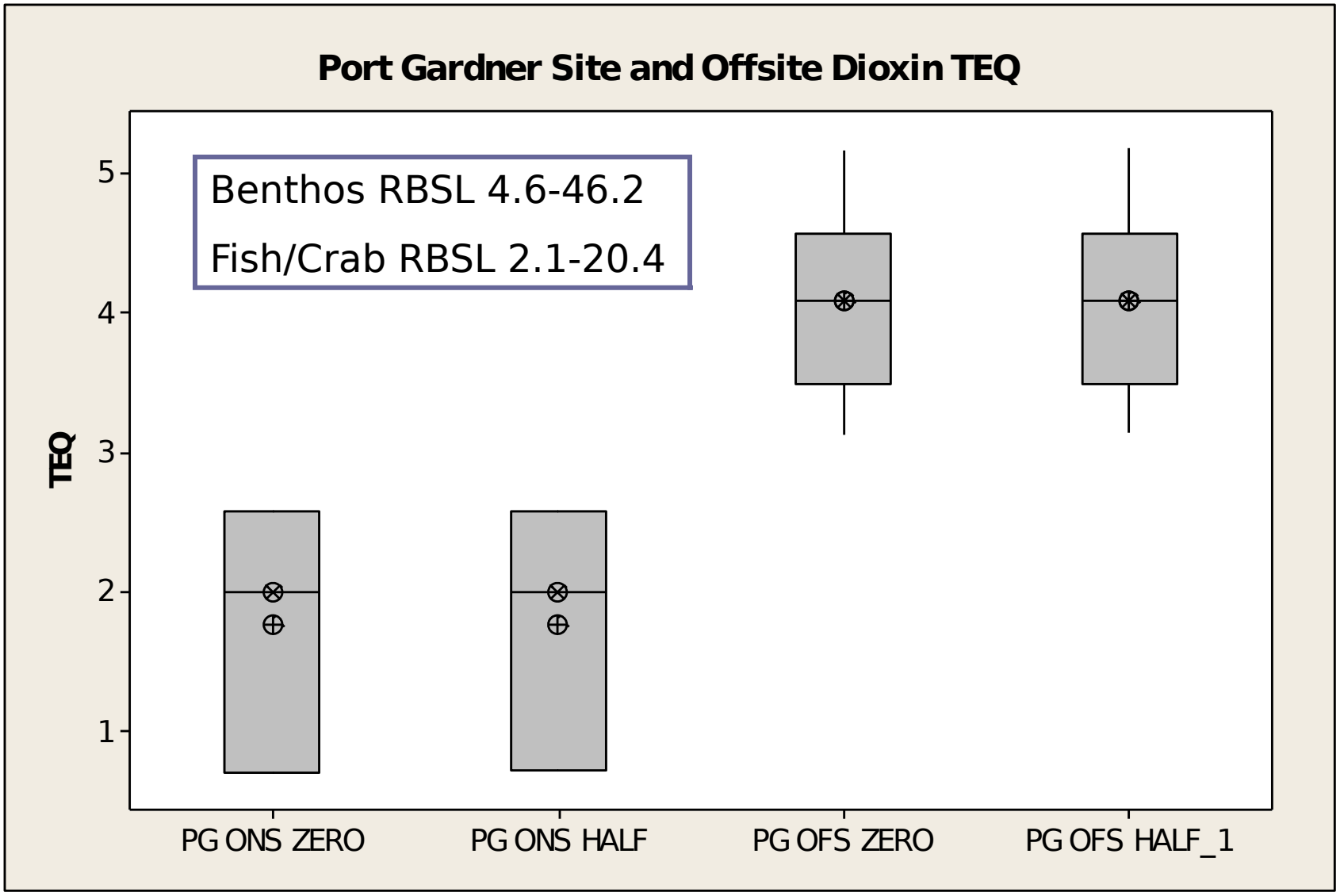

Elliott Bay Disposal Site
Dioxin/Furan TEQs
B3: 12.2
T5: 10.3
P1: 9.4
P3: 4.0
T1: 8.6
T3: 10.6
B4: 7.6
S4: 1.5 / 17.0
B2: 11.9
Z1: 0.7 / 2.5
P11: 6.3
S2: 6.7 / 9.7
Seattle
Elliott Bay
Disposal Site
P7: 8.7
B1: 6.6
Monitoring Station Type:
on-site
perimeter
transect
benchmark
B2: 11.9 = Station ID: 2007 TEQ
Z1: 0.7 / 2.5 = Station ID: 2005/2007 TEQs
0
1,000
2,000
3,000
Feet

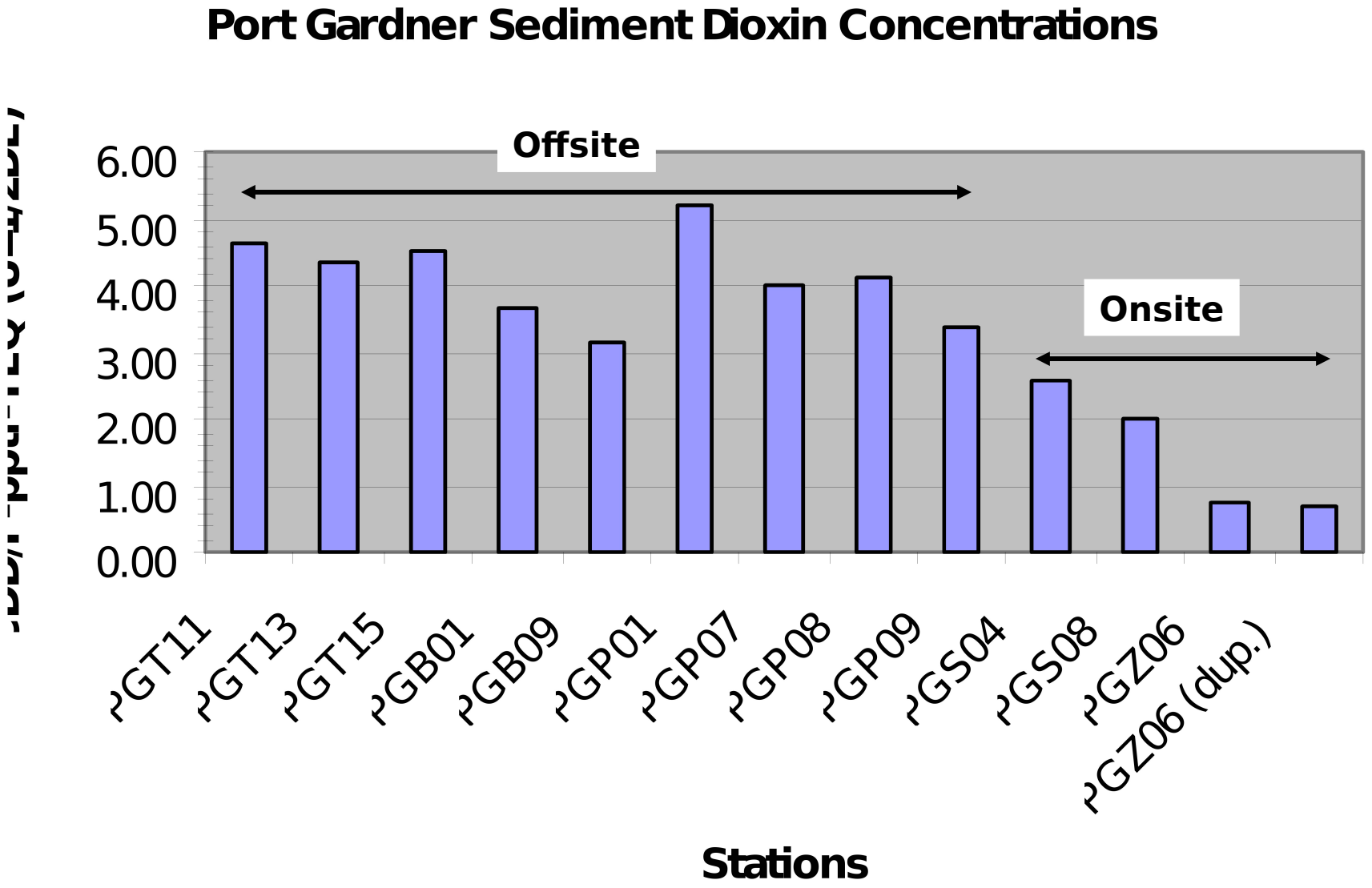
Note: Onsite 2007 TCDD/F increases likely attributable to Nov-Dec/06 disposal from Fisherman's Terminal, which was not evaluated for TCDD/F



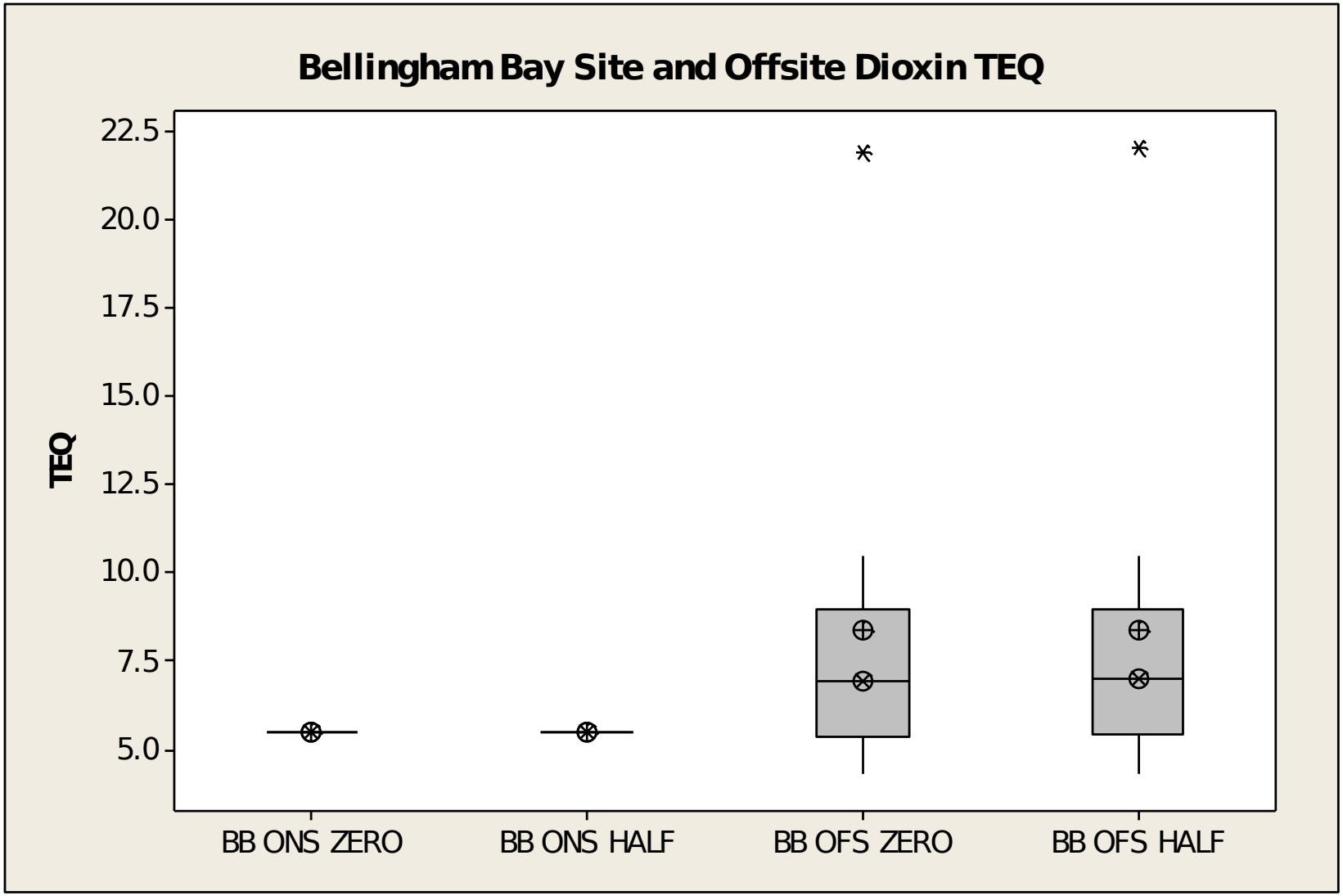

Lake WashingtonShip Canal
Dioxin/Furan TEQs
Golden Tides Marina
Ballard Locks and Dam
187 pptr-TEQ
63.1
6
3
Fisherman's Terminal
Legend
TEQ (pptr)
< 1
1 - 5
5 - 10
10 - 15
15 - 30
> 30
Dioxin Data Collected in This Area But Not Yet Acquired by the DMMP Agencies
0
1,000
2,000
3,000
Feet
Note 1: Undetected congeners are included in the TEQ summation at one-half the detection limit.
Note 2: Only TEQs greater than 15 pptr are labeled.
Note 3: Where more than one sample was taken from the same location, the sample with the highest concentration is shown.
Note 4: Some samples are cores, some are surface grabs.
Note 5: The mean latitude and longitude were used to plot composited samples.
Note 6: A plus sign (+) indicates that not all congeners with toxic equivalency factors were analyzed.

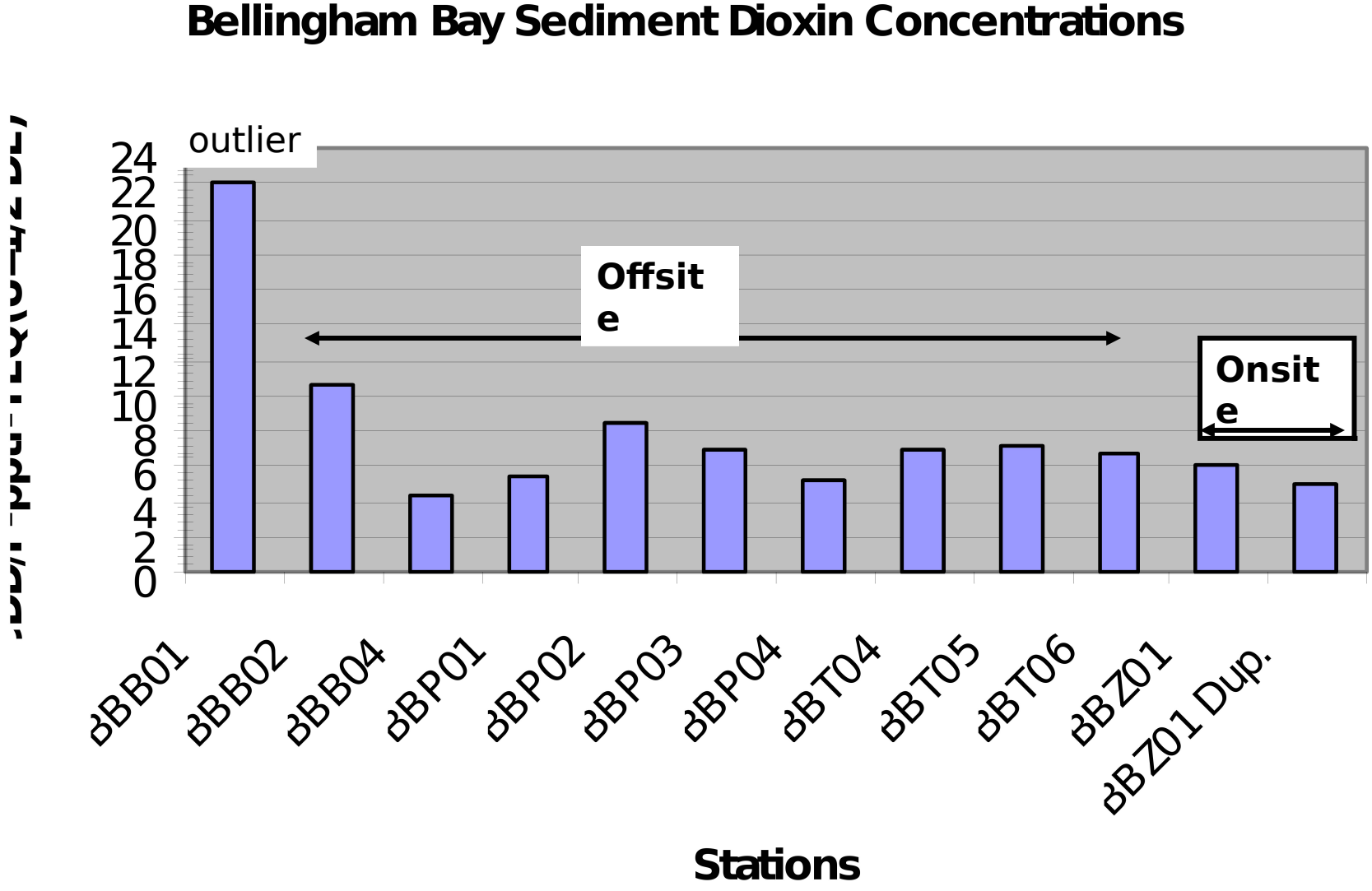
Port Gardner



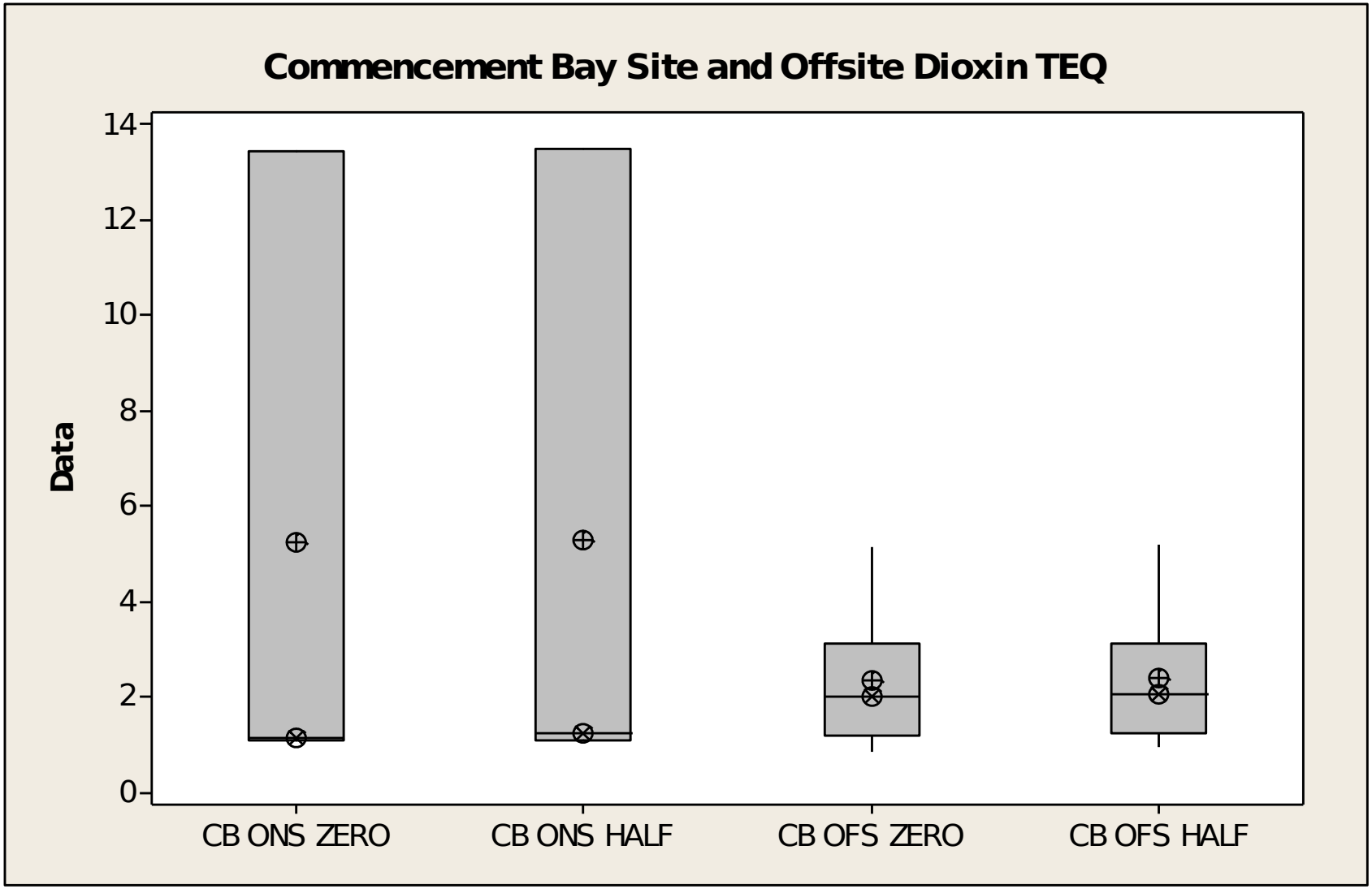

Port Gardner Sediment Dioxin Concentrations
Offsite
Onsite
6.00
5.00
4.00
3.00
2.00
1.00
0.00
PGT11
PGT13
PGT15
PGB01
PGB09
PGP01
PGP07
PGP08
PGP09
PGS04
PGS08
PGZ06
PGZ06 (dup.)
Stations

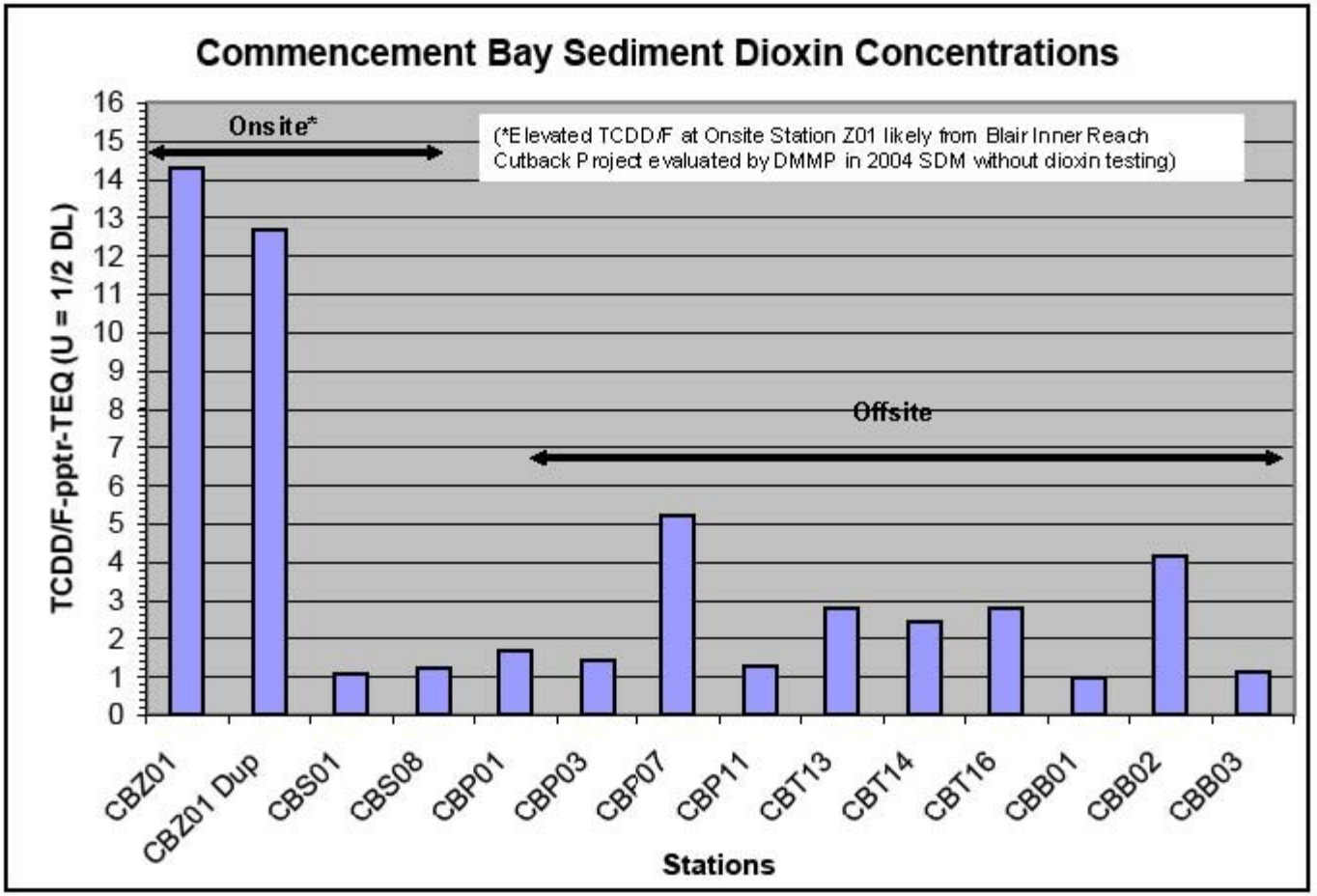
Bellingham Bay




Bellingham Bay Sediment Dioxin Concentrations
outlier
Offsite
Onsite
24
22
20
18
16
14
12
10
8
6
4
2
0
BBB01
BBB02
BBB04
BBP01
BBP02
BBP03
BBP04
BBT04
BBT05
BBT06
BBZ01
BBZ01 Dup.
Stations

Commencement Bay




Commencement Bay Sediment Dioxin Concentrations
Onsite*
(*Elevated TCDD/F at Onsite Station Z01 likely from Blair Inner Reach Cutback Project evaluated by DMMP in 2004 SDM without dioxin testing)
Offsite
TCDD/F-pptr-TEQ (U = 1/2 DL)
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
CBZ01
CBZ01 Dup
CBS01
CBS08
CBP01
CBP03
CBP07
CBP11
CBT13
CBT14
CBT16
CBB01
CBB02
CBB03
Stations

Dredged Material Disposal BMPs and Disposal History

–

Comments have been received that concentrations at sites can be managed through adjustment of placement BMPs - discuss

Breakout on Total Number of DMMP Projects using DMMP Disposal Sites

DY	A/K-ND	CB-ND	EB-ND	PG-ND	BB-ND	RS-D	PT-D	PA-D
89	0	1	0	0	0	0	0	0
90	0	0	1	2	0	1	0	0
91	0	1	1	1	0	2	0	0
92	0	0	5	0	0	3	0	0
93	2	0	4	2	1	6	1	0
94	0	0	3	1	0	1	0	0
95	1	3	6	2	0	1	0	0
96	0	1	3	1	1	2	0	1
97	0	0	5	1	0	0	0	0
98	0	2	3	0	1	1	1	0
99	0	2	1	0	0	1	1	0
00	0	1	5	0	0	0	0	0
01	0	2	2	1	0	1	0	0
02	0	Closed	5	2	0	0	0	0
03	0	5	0	0	0	1	0	0
04	1	5	2	0	0	3	0	0
05	1	4	5	0	0	1	0	0
06	0	1	1	3	0	2	0	0
07	1	1	1	1	0	2	1	0
08	1	1	4	1	0	0	0	0
09	0	3	1	2	0	1	2	0
Total:	**7**	**33**	**58**	**20**	**3**	**29**	**6**	**1**
Average/Year:	**0.3**	**1.7**	**2.8**	**1.0**	**0.1**	**1.4**	**0.3**	**0.05**
Total Vol (cy):	**140,543**	**7,997,573**	**2,624,697**	**2,771,683**	**78,883**	**1,826,598**	**46,480**	**22,344**
AVG/Project:	**20,078**	**242,351**	**45,253**	**138,584**	**26,294**	**62,986**	**7,747**	**22,344**

Legend:

A/K = Anderson Ketron; CB = Commencement Bay; EB = Elliott Bay; PG = Port Gardner; BB = Bellingham Bay; RS = Rosario Strait; PT = Port Townsend; PA = Port Angeles; ND = non-dispersive site; D = dispersive site

Breakout on Total Number of DMMP Projects under 10,000 cy at DMMP Disposal Sites

DY	A/K-ND	CB-ND	EB-ND	PG-ND	BB-ND	RS-D	PT-D	PA-D
89	0	1	0	0	0	0	0	0
90	0	0	0	0	0	0	0	0
91	0	0	0	0	0	0	0	0
92	0	0	3	0	0	2	0	0
93	2	0	4	0	0	3	0	0
94	0	0	1	0	0	0	0	0
95	1	2	2	1	0	0	0	0
96	0	0	2	0	0	0	0	0
97	0	0	4	0	0	0	0	0
98	0	0	0	0	1	0	1	0
99	0	1	0	0	0	0	1	0
00	0	0	3	0	0	0	0	0
01	0	1	0	0	0	0	0	0
02	0	Closed	2	1	0	0	0	0
03	0	0	0	0	0	0	0	0
04	1	0	1	0	0	1	0	0
05	1	2	3	0	0	1	0	0
06	0	0	1	0	0	0	0	0
07	0	0	0	1	0	1	0	0
08	0	0	1	0	0	0	0	0
09	0	3	0	2	0	0	2	0
Total:	**5**	**10**	**27**	**5**	**1**	**8**	**4**	**0**
Average:	**0.2**	**0.5**	**1.3**	**0.2**	**0.0**	**0.4**	**0.2**	**0.0**

DMMP has recently posted all Annual/Biennial Reports and ARM/SMARM Summaries

These include data and historical background on DMMP/SMS Issues

Relative Risk of Material in Nearshore vs. Disposal Sites –

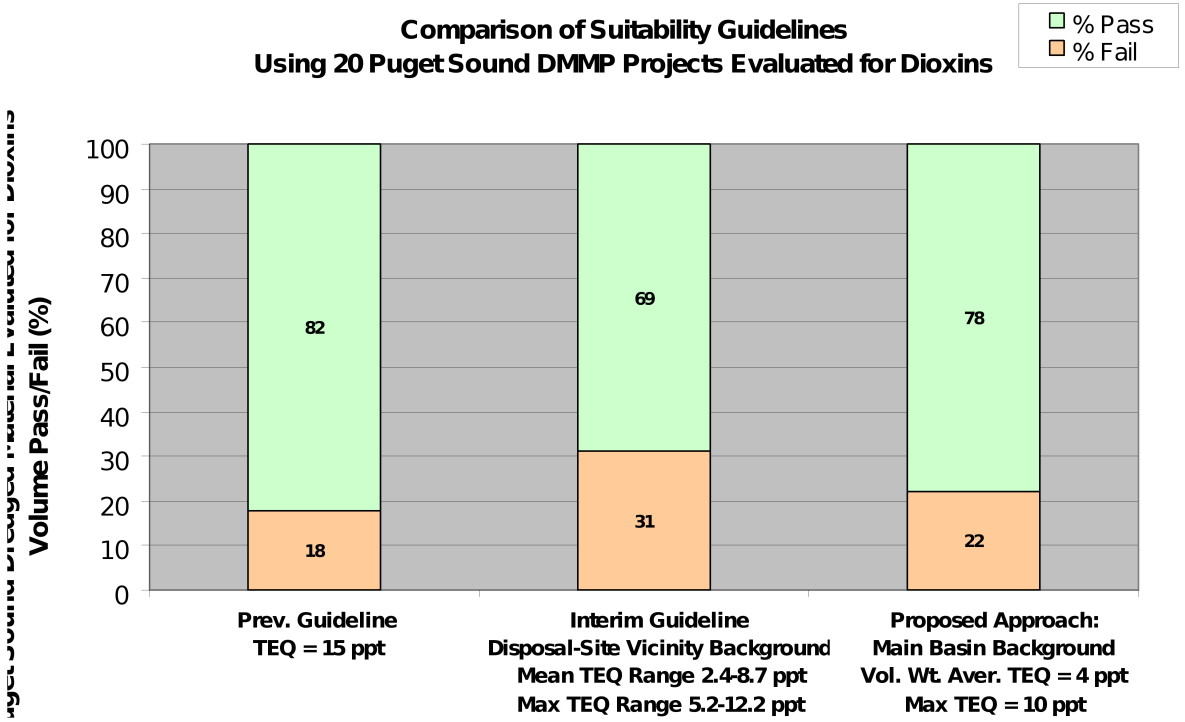
Comments have been received that relocation of material from nearshore to deep sites provides net environmental benefit - discuss

Pass/Fail Evaluation

Comparisons of Suitability Guidelines - Pass/Fail Impact

- SEE IMPACT ANALYSIS ATTACHMENT TO ISSUE PAPER
- All Puget Sound dredging projects over the last 21 yrs reviewed
- 20 of these projects tested for dioxins (~6% of total volume)
- The pass/fail impact was evaluated using these 20 projects

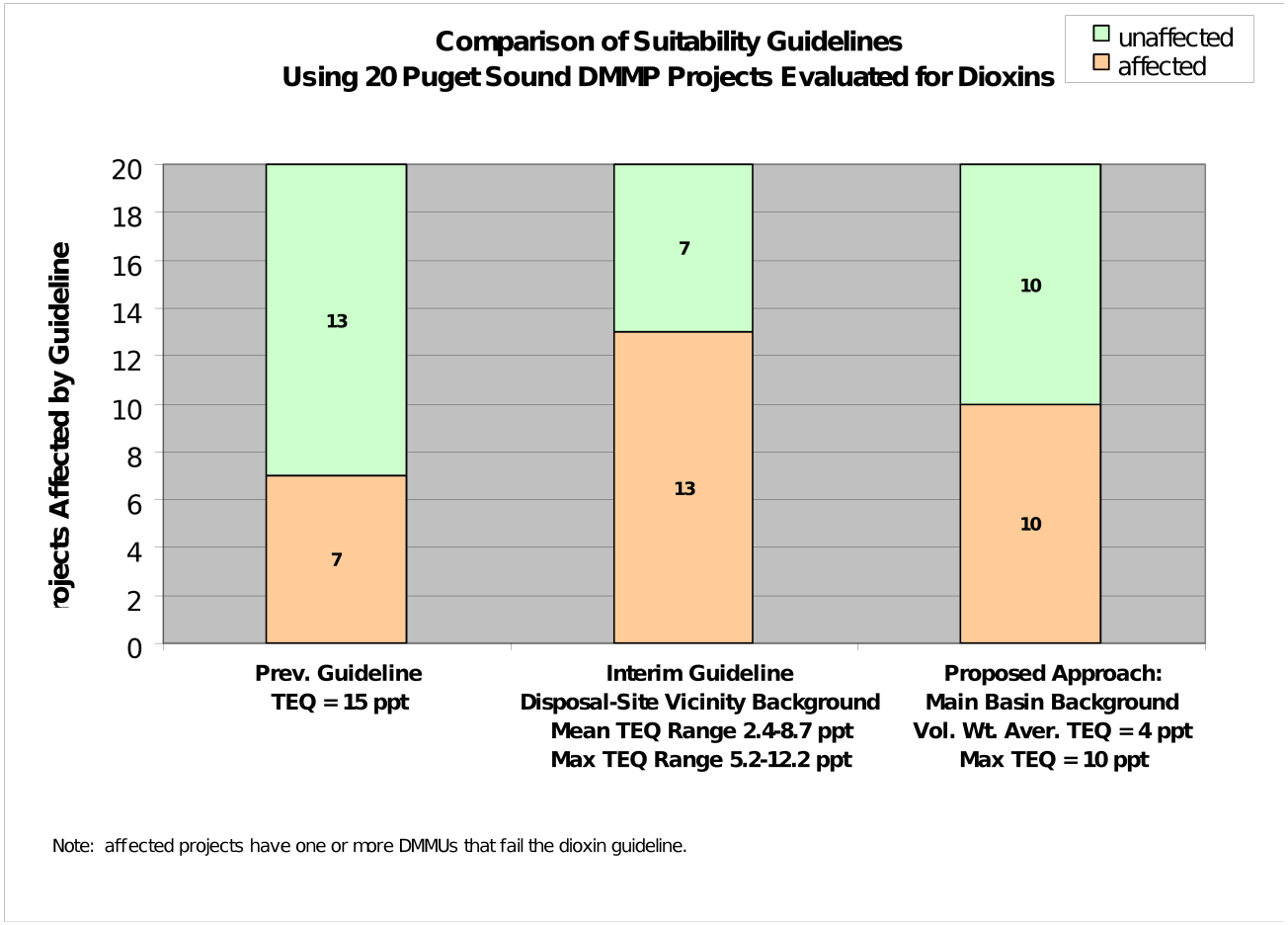
- The failure rate increased from **18%** (15 ppt TEQ guideline) to **22%** with the proposed guideline



Note: native material included only where tested.

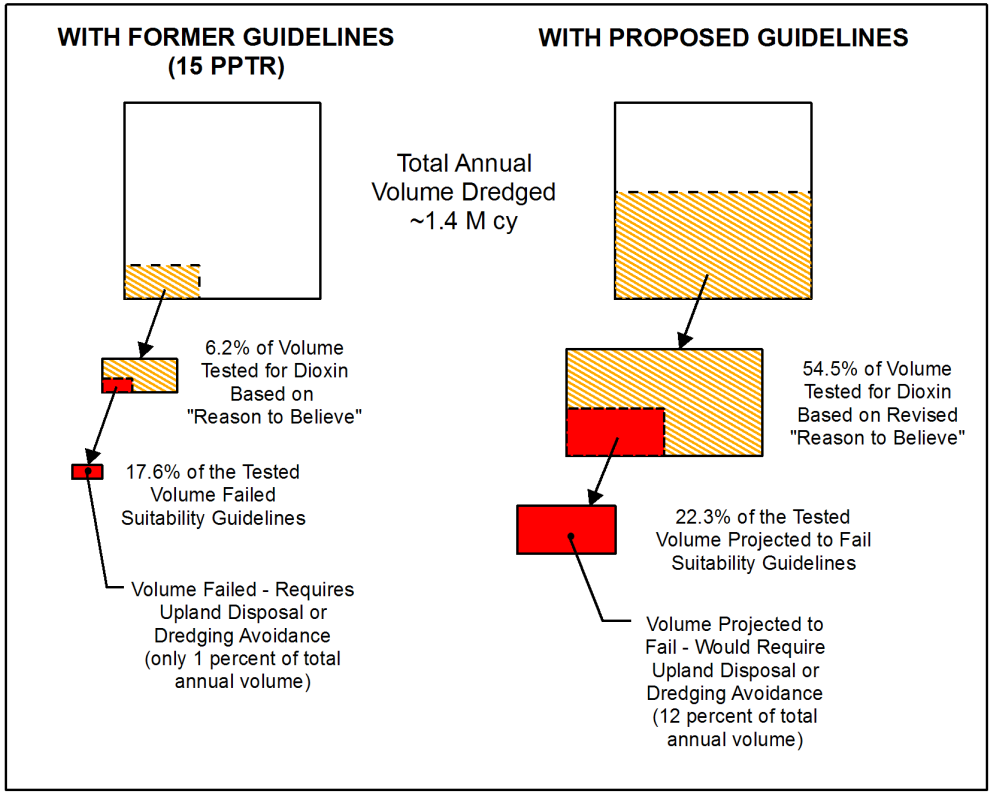
Comparisons of Suitability Guidelines – Number of Projects Impacted

- The number of projects affected increases from **7** to **10** (out of 20) under the proposed guideline



Increased Testing for Dioxins

- Over the past 21 years, 10% of projects tested for dioxins (6% of volume).
- In the last 3 years, 38% of projects tested for dioxins (33% of volume).

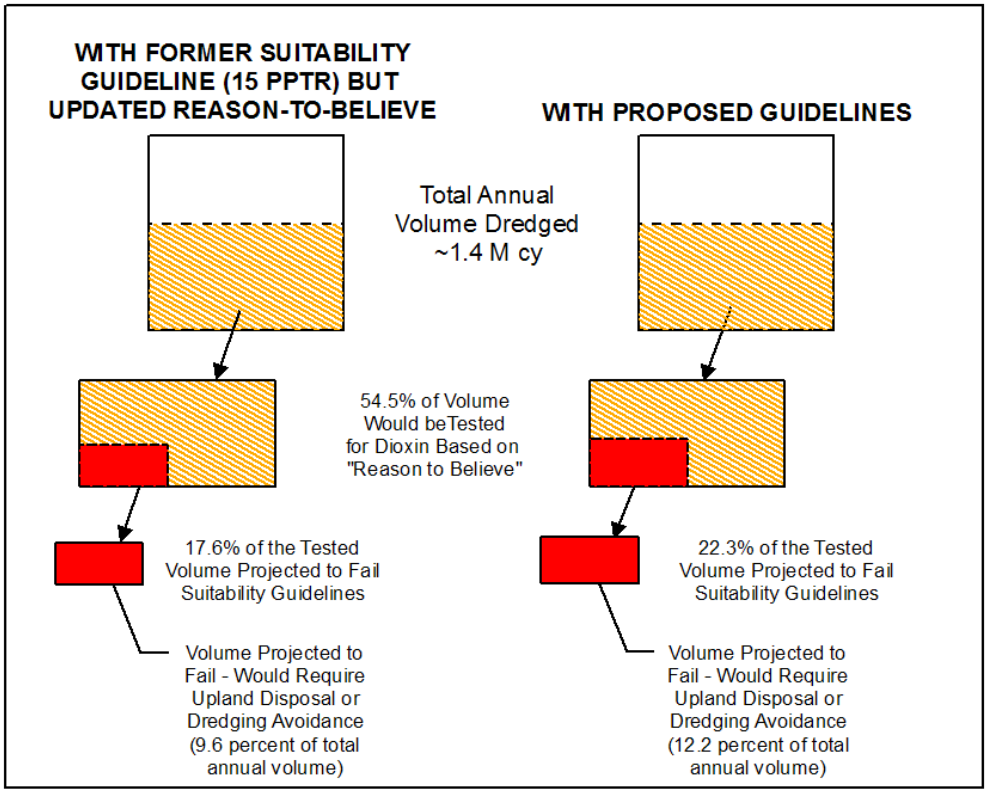


- With the revised framework **55%** of the annual project volume is estimated to require testing*.
- **12%** of the total annual dredging volume is estimated to be unsuitable for open water disposal with respect to dioxin.

* Most non-urban projects would not require testing, and deeper native material would not

Increased Testing for Dioxins – a Second Look

- The reason-to-believe guideline has already evolved


WITH FORMER SUITABILITY GUIDELINE (15 PPTR) BUT UPDATED REASON-TO-BELIEVE
WITH PROPOSED GUIDELINES
Total Annual Volume Dredged ~1.4 M cy
54.5% of Volume Would beTested for Dioxin Based on "Reason to Believe"
17.6% of the Tested Volume Projected to Fail Suitability Guidelines
22.3% of the Tested Volume Projected to Fail Suitability Guidelines
Volume Projected to Fail - Would Require Upland Disposal or Dredging Avoidance (9.6 percent of total annual volume)
Volume Projected to Fail - Would Require Upland Disposal or Dredging Avoidance (12.2 percent of total annual volume)

- With updated RTB, **9.6%** of annual volume would have failed under 15 pptr guideline.
- Compared to **12.2%** under the proposed suitability guideline.

* Most non-urban projects would not require testing, and deeper native material would not

Increased Cost Associated with Disposal

- Increased Disposal Cost of Unsuitable Material
  - Assuming that the increased volume of unsuitable material would still be dredged, but with upland disposal
  - Using a range of incremental cost for upland disposal of $30 to $122/c.y.
  - Using the annual dredge volume of 1.4 Million c.y. (21 yr history)
  - Estimating 11% of additional annual volume unsuitable for open-water disposal
  - Results in a range for annual incremental cost of $5 to $20 million
- The incremental cost is reduced to $1 to $4 million if the updated reason-to-believe guideline is used and the only difference is the suitability guideline.
- The agencies acknowledge the fact that in lieu of upland disposal, projects could be cancelled with significant associated economic impact.

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DREDGING IMPACT, RELATIVE RISK

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Dioxin/Furan Tissue Concentrations (ppt-dry-wgt-TEQ[1])* in the Vicinity of DMMP Nondispersive Disposal Sites (after SAIC, 2008b)

Taxa	Anderson/Ketron Island	Commencement Bay	Elliott Bay	Port Gardner	Bellingham Bay
BENTHIC:					
Annelids:					
Capitellidae					**0.37** (0.21 – 0.59), n = 8
Glyceridae		**0.38** (0.26 - 0.56), n = 7	**0.94** (0.31 – 2.51), n = 8		**0.40** (0.19 – 0.61), n = 2
Maldanidae		**0.35** (0.23 - 0.43), n = 4	**0.49** (0.42 – 0.53), n = 3		
Nephtys sp.				**0.13** (0.093 - 0.164), n = 9	
Spiondae					**0.21** (0.16 – 0.25), n = 3
Travisia sp.		**0.85** (0.66 - 1.07), n = 4	**0.66**, n = 1	**0.42** (0.36 - 0.60), n = 9	
Bivalves:					
Compsomyax sp.	**0.07** (0.05 - 0.13), n = 3	**0.08** (0.06 - 0.09), n = 2			**0.07** (0.06 – 0.083), n = 5
Yoldia sp.	**0.47**, n = 1				
Macoma sp.	**0.14**, n = 1				**0.12** (0.09 – 0.14), n = 3
Dungeness Crab					
(Meat)	**0.46** (0.214 - 0.716), n = 3		**0.18**, n = 1	**0.19** (0.18 - 0.19), n = 3	**0.09** (0.07 – 0.11), n = 3
(Hepatopancreas)	**13.5** (11.5 - 14.9), n = 3		**5.55**, n = 1	**2.04** (1.7 - 2.8), n = 3	**2.6** (1.7 – 3.3), n = 3
English Sole (*Parophrys vetulus*) (whole body)	**0.29** (0.172 - 0.345), n = 3	**0.66** (0.49 - 0.92), n = 3	**0.69** (0.41 – 1.03), n = 3	**0.44** (0.28 - 0.57), n = 3	**0.29**, n = 1
Starry Flounder (*Platichthys stellatus)* (whole body)					**0.10** (0.07 – 0.146), n = 3

*** Table entries show mean concentration, range (in parentheses) and number of observations (n)**

[1] Undetected congeners of dioxin/furan were summed at ½ detection limit